HARBOR BRANCH OCEANOGRAPHIC INSTITUTION
AQUACULTURE DEVELOPMENT PARK

Responses from HARBOR BRANCH Aquaculture Consultants
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August 29, 2002

The following responses are from questions submitted to Harbor Branch Oceanographic Institution (HARBOR BRANCH) Aquaculture Consultants, Dr. David Vaughan and Dr. Megan Davis from Dr. Amy Morgan Tomas, Roger Williams University. The questions are related to HARBOR BRANCH and it's planning, development, management, and operation of the HARBOR BRANCH Aquaculture Development Park. Responses correspond to the attached questions and the answers are referenced to the appropriate question by number (#) throughout the text.

Establishment of the Aquaculture Development Park

The HARBOR BRANCH Aquaculture Development Park concept took over ten years to be accepted and become a reality (#1, 2). In 1986, the idea of the Park was presented to the Institution's President who then managed over five research Divisions. The concept was presented by Dr. Dave Vaughan, a first year Principle Investigator in the Division of Applied Biology, then directed by Dr. John Ryther, originally of Woods Hole Oceanographic Marine Biological Laboratory. The concept was received well, but the HARBOR BRANCH President left prematurely and the replacement President thought the idea was not in scope with the institution's goals and the plans were shelved for five years. In 1991, under another new administration, the Division of Aquaculture was organized with Dr. Vaughan as the Director. After about three years of building up the Division with outside awarded grants and contracts from applied technologies and training programs the original Park plan was revisited. The Aquaculture Development Park was officially opened in 1996.

Mission for the Aquaculture Development Park

To provide a centralized area where industry, researchers, government and educators can collaborate to improve existing aquaculture technology, transfer technology, and develop innovative system and culture technologies.

Strategic Plan for the Aquaculture Development Park

A strategic plan for the Aquaculture Development Park was developed (#3) based on the Aquaculture Division's assets and the industry's needs. The Aquaculture Division had assets in terms of research labs and experienced staff, but had a difficult time financially relying on only research grants. Industry seemed to take the discoveries of research, but not be able to bridge the gap to commercialization. A business study was

conducted to ascertain why aquaculture corporations were not further along in developing technologies from research to create financial success and stability. A long list of "Fortune 500" companies had an unsuccessful history of aquaculture development. The underlying reasons for failure were similar time and time again. Most companies failed for similar reasons:

- Great expense and time required to locate, purchase and permit land.
- Large expense to design, build and outfit buildings.
- Tremendous difficulty in attracting and hiring experienced staff.
- Lack of available services for hatchlings, feeds and disease diagnosis.

These reasons attributed to huge expenditures, and long amounts of time required to accomplish even small advances, let alone have a final product to sell. Most large companies abandoned costly ventures after 2-5 years, even when they may have been on the brink of success.

In order for aquaculture to be attempted by any size corporation, these limitations had to be removed or lowered to an affordable risk level or cost. The goals of the Park facilities (#4) were to fill in the gaps that were limiting the commercialization of aquaculture ventures and provide funding to the HARBOR BRANCH research component. Because the Aquaculture Division staffs have the most experience in developing technology, they were considered the best suited to train others or provide skills to the aquaculture tenants in the Park. The research staffs are familiar with the difficulties in hatchery production, feed development, and disease issues. If these skills are a service to the industry members it becomes a "Win-Win" situation. If the industries were successful, there would be sufficient financial gain to fund continued research and development in the Aquaculture Division (#4).

Tenants in the Aquaculture Development Park

The plan for the Park evolved over time (#5) by starting with existing facilities and leasing space to outside corporate research scientists. The plan then progressed to supplying all aspects to Park tenants such as the use of HARBOR BRANCH staff, management and new facilities. The first tenants to lease from the Aquaculture Division leased an office, a laboratory and a hatchery, and used their own staff to operate their facility (#8). That company then started their own R & D shrimp company, which was the research arm of their parent company. After a relatively short period (6-12 months) they had made such tremendous improvements in the process of the parent company, that they paid for their work ten times over. The company decided to lease more space, hire additional staff and subcontract some work out to HARBOR BRANCH. That same year they committed to leasing new space and 7,000 sq. ft. of buildings were constructed for their use. Later they became the first tenants in the Aquaculture Development Park, and built over 13,000 sq.ft. of their own facilities.

The first tenant was referred to HARBOR BRANCH from the industry. The institution is known in the industry as a key research facility with exceptional programs in the region (#9, 10). It took only a few trips and a few meetings to convince the principle players of the benefits of their company locating to HARBOR BRANCH.

The biggest roadblocks to establishing tenants and being able to keep them were: legal contracts, lease contracts and total costs (#6,23,26, 27). Most tenants were convinced in a number of weeks to just a few months to establish residence in the Park, however, HARBOR BRANCH's administrative legal paperwork and contracts often took months to up to a year to negotiate. This delay could be the reason for some clients to be lost. Standard rents were reasonable ($2-$3 per square foot per year), and capital reimbursement credit of rent for building construction was also reasonable (1-5 year payback credit), however, careful consideration to royalties (5-10% of gross revenue) or higher rents ($5-10 per square foot per year) needed to be negotiated to provide fair contracts for both parties.

The tenants who benefited the most from the Park facility were start-up clients; e.g., those who wished to immediately lease existing facilities without having the costs to build new infrastructure (#7). These tenants also needed limited staffing and overhead, but could get established in a legitimate location for a reasonable fee. Other tenants who wished to prove a simple principle would also benefit from the Park, especially in cases where it would take more time and money to plan, build and permit facilities than to carry out the trial.

It was these kind of tenants that were targeted at the main industry trade shows, exhibitions and conferences (#11). A brochure was developed for mailings and handing out at trade shows (see attached). A computerized "walk-through" of the park was developed using multi-media and was projected on a computer screen at the trade show booths. Occasional advertisements were entered in industry journals and trade magazines. Formal talks and presentations were also made at industry conferences, especially at national World Aquaculture Society meetings. Workshops at state and local conferences were held on-site to attract participants. But most calls came in as cold calls from referrals and agencies forwarding information.

Tenants that have leased in the Park since 1996 include (#24, #25):

- Three shrimp companies (2-6 years in the Park)
- Two clam companies (1 is a current tenant, >8 years))
- Three engineer consultants (2 are current tenants, 8 years)
- One marketing consultant (new to the Park, 7 months)
- One marine ornamental company (HB subsidiary now)
- One food fish company (1-2 years in the Park)
- One feed company (current tenant, 8 years)
- One supplies company (current tenant, 6 years)

Services offered in the Aquaculture Development Park

The services offered to tenants (#12) were the full range from a simple lease of an office to building a turnkey business that is designed, constructed, staffed and managed. The Aquaculture Development Park offers the following services:

- Lease of existing space: offices, laboratories, hatcheries, outside space, and/or new buildings.
- A site permitted for aquaculture.
- High quality fresh and salt water sources.
- Recirculating systems and waste water treatment processing.

- Production of live feeds (algae, rotifers; and artemia); fish fingerlings, clam seed or shrimp post-larvae; nursery size animals; and broodstock.
- Disease diagnostics through the Aquatic Animal Health Laboratory (www.aquatichealth.org).
- Feed laboratories for formulations and diets.
- Water analysis through the HB Environmental Laboratory.
- Engineering services through the HB Engineering Services Inc.
- Research scientists and aquaculture staffing.
- Training and education facilities (www.aquaculture-online.org).
- Institution library, labs, cafeteria, and offices.

The most important service the tenants are interested in is the ability to utilize salt and fresh water under HARBOR BRANCH's permit and the capability to discharge the waste through the Aquaculture Development Park's water treatment and containment system. All services are offered to all tenants, but they pay on an as needed basis and a facilities space basis for water usage.

Services that should also be included (#13) are: financial planning, business management and marketing. Not incorporating these planning tools into the business were some of the primary reasons that some companies failed. Services that were hard for HARBOR BRANCH to provide to tenants and make financially sound were supplying "live feed" organisms. They were difficult to market on a consistent basis and, therefore, difficult to charge enough to make it financially worth while to produce.

Financial and Legal Planning for the Aquaculture Development Park

Financial and legal planning for the park was all done in-house (#14). Financial costs for the park were internally loaned to the Aquaculture Division with interest, by the Institution. Initially, matching funds were appropriated through State funding, but the $1.2 million promised over 10 years only lasted as two years of funding, at about $100,000 each year. The total 2.2 million capital expenditure was initially burdened by the Aquaculture Division, but later was reallocated to the Institution. The Institution is the owner of assets and improvements in the Park.

Legal issues of permits and planning were done in-house and then submitted to engineer or architects if required. A structural engineer was used for calculation of the surface water runoff as required by state statute. Only hard structure building drawings were completed by a licensed architect using in house prepared CAD drawings.

There was no formal financial plan (#15), only a simple financial analysis, which showed that 50% occupancy would pay back all primary forecasted costs in less than five years. It was also estimated (#16) that after year five all Aquaculture Division research and education costs could be covered and be self-sufficient. The plan projected that there would be at least five major tenants and 5-10 minor tenants at all times. It was hoped that there would always be enough major anchor tenants to provide about $100,000 each from rents and royalties. It would take $250,000 or 2.5 tenants to cover all of the costs to operate and maintain the park. The additional tenants would provide for initial Park expenditures and revenues for aquaculture research and education.

Budgets (#17) were calculated by the Aquaculture Division administration using simple "Excel" spreadsheets and turned into the HARBOR BRANCH accounting office where they were entered into the main institution program "Cost-Point". All accounting was then done by HARBOR BRANCH. Initially, the tenants were responsible for their own payment of rent without being invoiced. However, outstanding payments for rent, and receivables were difficult to track, therefore, an invoicing process was initiated (#18).

Organizational Structure of the Aquaculture Development Park

The original organizational structure of the Aquaculture Park was similar to the structure of the Aquaculture Division under HARBOR BRANCH (#19). The Aquaculture Division ran their own operations and managed their own staff. HARBOR BRANCH became involved when legal and financial issues and construction permits were involved. Initially, the Aquaculture Division reorganized into a separate research area on the north side of HARBOR BRANCH with the development, education and support services on the south side where the Park was being established. The development component consisted of the industry partners or tenants renting, building or operating their own projects. The support services consisted of a large-scale clam hatchery, a feed development building and an aquatic animal health laboratory. In the center of the park was the education component, ACTED or the Aquaculture Center for Training, Education and Demonstration (www.aquaculture-online.org). This consisted of a main building (see attachment), which housed the rest rooms, showers, lockers, main reception office, conference room and classroom. It also has offices for the faculty and some of the Park tenants. This building has a full covered breezeway for tank demonstrations, picnic benches and soda machines. Next to the main buildings are the ACTED training hatcheries. These are commercial scale buildings (30' x 152') for demonstrating "hands-on" hatchery and aquaculture growout processes. There are three buildings, one each for fish, mollusc and crustacea. There is plenty of room for classroom demonstrations and individual workings in an industrial scale setting. Supplies and equipment for the ACTED facilities were partially funded through a $200,000 capitalization grant from Indian River Community College. The HARBOR BRANCH Aquaculture Division and Indian River Community College began a collaborative aquaculture 2-year degree and 1-year certificate in 1998. All of the aquaculture courses are taught in the Aquaculture Development Park.

The original intentions were for the private industries to surround the ACTED facility. The students could watch the developing industries and they could be trained for future employment. This concept is currently working with our Indian River Community College students. The support services were to be in the background and operated by Aquaculture Division staff to supply the requirements of seed, feed, etc. for the developing industry members. Over time (#20, 23,24) it has changed, the private industry partners that were the larger scale, anchor tenants have either dissolved as unsuccessful companies or moved away as successful companies graduating from a developing idea to a larger company off-campus. Only the smaller companies that rent a limited amount of space are still in the Park now.

Today, HARBOR BRANCH has it's own private companies or subsidiaries. These subsidiaries came about from a company that had unpaid debts and they were formed from research ideas that were developed in the Aquaculture Division. HARBOR

BRANCH taking over companies as their own commercial subsidiaries, has of course changed the organizational arrangement. The large clam hatchery, once only a support service for the training programs and industry graduates now is the largest clam hatchery in the country and is a commercial subsidiary (HB Clams Inc.) owned by HARBOR BRANCH. The marine ornamental company that went bankrupt owing HARBOR BRANCH thousands of dollars was bought out by HARBOR BRANCH and is now the worlds largest marine ornamental aquaculture supplier (ORA), to the aquarium trade. The indoor shrimp experiments continued by HARBOR BRANCH is now another commercial entity (HB Shrimp, Inc.) owned by HARBOR BRANCH. The three main anchor tenants are now the HBOI commercial subsidiary corporations. The Park continues to rent to tenants, however, there are restrictions. For instance, other shrimp and marine ornamental facilities will not be able to lease space in the Park due to potential competition. There are also some restrictions on the courses that can be offered in the ACTED program. The positive side to the HARBOR BRANCH subsidiaries is that they will assist in supporting research and educational efforts at the institution.

Suggestions for Aquaculture Development Park

The aspects of the Park that are most successful (#21), is the concept of the Park having all of the master planning and permitting taken care of. The aspect of services and experienced staff being readily available is also a great advantage to the tenant, but not a necessity. One recommendation would be to change the rental rates to be proportional to the time the tenant is located at the facilities, (e.g., the longer an entity was there, the higher the discount on rent), this would potentially keep tenants leasing for a longer period of time. The Park is in need of additional pre-built general areas for labs and offices. This would make it easier for tenants to move in quickly without having to build new space if it is not vacant. It is recommended that the salt water area be separate from a fresh water area. The Park was first planned as a marine park, but over half of the users are now growing marine species in fresh water. This makes it difficult to recycle the wastewater when the salinity is varied in the retention ponds. Storage capacity facilities in the Park should also be increased for the tenants.

The biggest surprises (#22) were the inability of commercial companies to succeed in their first few years, even if all of the technical, logistical and permitting problems were solved for them. The typical problems of management, marketing and financing still play a large role in the success of commercial businesses.

Questions for HBOI Consultants July, 2002

1. What types of planning were undertaken prior to establishing HBOI?
2. How long did the planning process take?
3. Was a strategic planning process used?
4. What initial goals were set for the facility?
5. How did these goals evolve over time?
6. What were the biggest roadblocks to establishing HBOI?
7. What type of tenants benefit most from your facility?
8. Who were your first tenants?
9. How did you learn about your first tenants?
10. What kind of contact did you have with these first tenants? Did they require an aggressive marketing effort or did the idea "sell itself"?
11. What steps are taken to market HBOI on an ongoing basis?
12. What services do you offer to tenants? Are they priced individually or included in a package fee?
13. What services would you like to add? Discontinue?
14. Were financial and legal planning done in-house or hired out initially?
15. Did you begin with a formal financial plan?
16. What expectations of income and expenses did you begin with?
17. What type of budgeting process do you use?
18. Are you satisfied with the process?
19. What did the initial organizational structure for HBOI look like?
20. How has that structure changed over time? Why?
21. What aspects of HBOI do you find most successful? What aspects would you change?

22. What were the biggest surprises (unanticipated problems and opportunities) that HBOI encountered in its first two years?

23. What is the composition of HBOI's current tenants?

24. Has HBOI had any difficulty retaining desirable tenants? If yes, what were some of the specific problems encountered in retaining them?

25. Has there been a typical length of time, or ranges of time, that a tenant has utilized HBOI? If yes, what are those times?

26. What have been typical reasons for tenants staying at HBOI? For departing? Among those reasons, which do you feel have been most important?

27. What have you found to be the usual length of time from initial discussions with a prospective tenant to actual occupancy?

Harbor Branch Oceanographic Institution
Aquaculture Development Park

Follow-up responses from HARBOR BRANCH Aquaculture Consultant

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October 25, 2002

These responses are to follow-up questions submitted to Harbor Branch Oceanographic Institution Aquaculture Consultant, Dr. Megan Davis from Dr. Amy Morgan Tomas, Roger Williams University.

1) Did HARBOR BRANCH use any of its recurring, annual operating funding during 1996, 1997, or 1998 to fund shortfalls, specific projects, unfinished building efforts or specific leasehold improvements at the HARBOR BRANCH Aquaculture Development Park?

The Aquaculture Division used their operating budget to fund shortfalls, specific projects, unfinished building efforts or specific leasehold improvements. However, when the Aquaculture Division was over budget, the shortfalls went into a payback debt owed to the Institution. Two years ago the Institution absorbed this debt.

2) During the first two years, what percentage of the Park's operating costs were paid for by rents, leases and fees from independent (non-affiliates of HARBOR BRANCH) tenants? This assumes that debt and capital costs are not included in operating costs.

The Aquaculture Division collected approximately $250,000 per year from the tenants. These revenues were used to cover shortfalls in Division's administrative costs, educational costs, some research project costs, electrical costs and salaries for the facilities staff. It covered approximately 1/3 of the operating expenses of the Aquaculture Development Park.

3) Clarification of the usage of the $2.2 million: Do we understand correctly from the question responses that the Park started its existence in an office, lab and hatchery that already existed and in which the initial tenants did not have to pay rent? If so how long did this arrangement last?

In year one, the first tenants did use existing infrastructure located on the North side of campus. They did pay rent on the use of the office, lab and hatchery space. This rent payment was used to cover the rent expenses charged by the Institution. After the first

year, the tenants moved to the Aquaculture Development Park located on the South side of campus.

4) How many square feed of Park did the $2.2 million purchase and was this sufficient, or did they start out cramped? The promotional brochure states that 50% of the Park is devoted to industry partners. Does this mean that the $2.2 million paid for half of the structures described in the brochure?

The $2.2 million paid for 200,000 sq. ft. in the Park. It covered the greenhouse buildings, offices, and classrooms. It also covered equipment (e.g., tanks, filtration) in the majority of the buildings. There were no land costs. As a summary the funds covered:

a) initial fill for the land
b) engineering drawings
c) permits
d) wetland consultants and storm water retention
e) electrical hookups
f) pumps, pumping stations, pvc delivery lines for the salt and fresh water well water
g) pretreatment system and reservoirs for salt and fresh water
h) three retention ponds for effluent
i) feed laboratory
j) shop
k) 50,000 sq ft of greenhouses (10 greenhouses)
l) 5,000 sq ft of offices, classroom, reception, covered breezeway, bathrooms with showers and lockers

Approximately 50% of the Park was initially devoted to industry partners. The $2.2 million covered infrastructure for industry partners and also the education and research facilities for the Aquaculture Division.

The Park was not cramped. There was sufficient space for industry partners and educational and research activities. In the past 3-5 years the park has expanded to include an additional 28,000 sq. ft. of greenhouse area. This additional infrastructure was paid by the industry partners that located to the Park.

5) What specific steps did HARBOR BRANCH take to "fill the gaps that were limiting the commercialization of aquaculture ventures?" The "gaps" appear to be the four obstacles cited: 1) Great expense and time required to locate, purchase and permit land; 2) Large expense to design, build, and outfit buildings; 3) Tremendous difficulty in attracting and hiring experienced staff; 4) Lack of available services for hatchlings, feed and disease diagnosis.

The Aquaculture Development Park was fully permitted for aquaculture activities. The tenants either used existing infrastructure or built new infrastructure in the Park. The tenants utilized Aquaculture Division staff for production, for feed development and feed

needs, for hatchlings (post larval shrimp, clam and oyster seed and fish fingerlings), and for disease diagnosis. These services enabled the tenants to develop their businesses and test their concepts in a timely manner.

6) How did HARBOR BRANCH address similar business sharing spaces while protecting each business's safety of intellectual property?

All staff signed that worked with the industry partners would sign confidentiality agreements. The employment agreements in the Aquaculture Division and in the private industries stated that employees could not be stolen from the Division or the private industries unless it was discussed between entities. The employees could not be head hunted. There was also a policy that there would not be similar businesses in the Aquaculture Development Park (e.g., two shrimp nursery and growout ventures). However, there could be diverse businesses on site that worked with the same species (e.g., shrimp nursery and growout, shrimp nutrition, shrimp genetics, shrimp hatchery, shrimp disease).

7) What process did HARBOR BRANCH use for collecting monthly payments and how long did HARBOR BRANCH let late payments or non-payments slip by before acting? What steps did HARBOR BRANCH take when it acted to collect late rents?

Initially the controller wrote into the lease agreement that the tenant would be responsible for the rent payment on a monthly basis. The Institution wanted to avoid the extra paperwork of billing and collecting on a monthly basis. This proved to be problematic, because there was no paper trail or accounting to assist in collections and late payments. In the past three years this was changed. The Institution now invoices on a monthly basis. Payment is expected within 30 days. If payment does not occur a reminder invoice is sent out after 30 days and again after 60 days. If the payment does not occur after 90 days there are three approaches that may occur: 1) there is a phone call to the client asking for payment; 2) a letter is sent indicating that services provided by HARBOR BRANCH will not continue until payment is received; and/or 2) the non-payment is sent to the Institutional attorney for collection. In some cases the tenant asks for deferment of payment until a crop is harvested.

8) What pitfalls should we be trying to avoid in the planning and early development processes?

Permits and Master Plan:

It is important to develop a master plan that lays out where infrastructure (e.g., buildings, plumbing, electrical) is located on the property. Permits can only be acquired for the infrastructure that can be built within a given period of time. However, the master plan can show future expansion, which will assist in obtaining future building permits.

Retention Ponds and Effluent:

Make sure that the retention ponds are sized to match the maximum use of water. If both fresh and salt water are used in the Park, it is recommended that two sets of retention ponds be built. This may allow for the effluent water to be reused. It is also recommended that the retention ponds be designed to allow for dry out and rotation.

Design of Buildings and Systems:

It is important to have consistency of design and system type throughout the Park. This is especially necessary because tenants may only be temporary in the Park. We chose to build greenhouse structures in the Park. However, the greenhouses can and do vary in size and type of cover in the Park. We also require that the tenants use recirculating system technology when designing and building their production systems.

Phase Development:

It is recommended that you work with the tenant to develop a phase approach to production. You might want to suggest to the tenant to build an experimental unit (e.g., one bay of a greenhouse) first that has the capacity to expand into a production unit (e.g., four bay greenhouse). For example, the tenant may be planning on operating four greenhouses when they are in full production. The first year could take place in the first greenhouse, then based on the success of the experimental year the lease could be changed the following year to allow expansion into production. If this approach is taken the incoming water line, out going effluent lines, and electrical hookups and lines should be planned and built in initially to allow immediate expansion. In the Aquaculture Development Park we bury all of our incoming and out going water plumbing and electrical lines. As these lines are buried we record their location with a digital camera and print out a hard copy, which is labeled and filed for future reference.

Lease Agreement and Invoicing:

It is suggested that a formal lease with terms be signed either on a year-to-year basis or a maximum of 5 years. Invoicing policies need to be established to ensure timely payment of rent and other services.